PATENT
Attorney Docket No. 207138
Client Refence No. 20762-RCE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:

Nakagawa et al.

Art Unit: 1771

Application No. 09/705,838

Examiner: Victor S. Chang

Filed: November 3, 2000

For: ADHESIVE TAPE AND SUBSTRATE FOR ADHESIVE TAPE

APPELLANTS' APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In support of the appeal from the final rejection dated May 7, 2003, Appellants now submit their Brief.

Real Party In Interest

The patent application that is the subject of this appeal is assigned to Nitto Denko Corporation.

Related Appeals and Interferences

There are no appeals or interferences that are related to this appeal.

Status of Claims

Claims 1, 2, 6-12, and 15-20 are currently pending and are set forth in the Appendix attached hereto. Claims 3-5, 13, and 14 were cancelled in the "Response to Office Action" dated September 30, 2002. Claims 1, 2, 6-12, and 15-20 are rejected and are the subject of this appeal.

Status of Amendments

All amendments have been entered by the Office.

Summary of Invention

The invention pertains to a substrate for an adhesive tape (claims 12 and 15-20), and an adhesive tape comprising the substrate and an adhesive layer (claims 1, 2, and 6-11). The substrate comprises an olefin polymer and a flame retardant, but substantially no halogen atom, wherein the olefin polymer comprises the following Component A and Component B:

Component A: a thermoplastic resin having a carbonyl oxygen atom in the molecular skeleton;

Component B: a propylene/ethylene copolymer obtained by multi-step polymerization involving two or more steps;

wherein the Component B has a dynamic storage modulus (E') at 23°C of not less than 200 MPa and less than 400 MPa, a dynamic storage modulus (E') at 80°C of not less than 40 MPa and less than 180 MPa, and a dynamic storage modulus (E') at 120°C of not less than 12 MPa and less than 70 MPa (see, e.g., specification at page 3, lines 25-38).

By use of Component B with the above-identified properties, the adhesive tape is free from the generation of dioxin and toxic gas upon incineration. Additionally, the use of Component B ensures the adhesive tape has high levels of resistance to thermal deformation and flame resistance. Moreover, use of Component B provides an adhesive tape with high levels of stretchability, which is beneficial in winding a tape (see, e.g., specification at page 20, lines 14-19).

In particular, the specific dynamic storage modulus (E') of Component B ensures the thermal deformation of the adhesive tape is sufficiently suppressed (see, e.g., specification at page 20, lines 20-26). Because Component B has a dynamic storage modulus (E') at 23°C of not less than 200 MPa and less than 400 MPa, the adhesive tape shows superior flexibility, thereby enhancing its followability to the object to which it is adhered.

The adhesive tape of the present invention exhibits fine winding workability equivalent to that of an adhesive tape having a polyvinyl substrate (PVC tape). As described in the specification, adhesive tapes using PVC as a substrate were previously widely used (e.g., as an insulating tape for electrical equipment). Adhesive tapes using PVC have a wide range of economical, as well as other, benefits, including fine flexibility and stretchability, flame resistance, resistance to thermal deformation, and electrical insulation (see, e.g., specification page 1, lines 7-24). However, because PVC is suspected of generating dioxin and toxic gas upon incineration, adhesive tapes using PVC are being replaced by adhesive tapes using other materials, which may not afford the same beneficial effects of adhesive tapes using PVC (see, e.g., specification page 2, lines 1-32). For example, conventional adhesive tapes having a polyolefin substrate exhibit relatively poor winding workability. The use of such conventional adhesive tapes having a polyolefin substrate results in the need for

more frequent cuts and twists (e.g., when the tape is wrapped around the circumference of a number of bundled wires), which require additional time for tape winding. In contrast, adhesive tapes having a PVC substrate and the adhesive tape of the present invention show fine winding workability.

Issues

The issue on appeal is whether or not the subject matter defined by claims 1, 2, 6-12, and 15-20 is obvious under 35 U.S.C. § 103(a) over Tucker et al. (U.S. Patent 5,498,476), individually, or in combination with Richardson et al. (WO 97/05206).

Grouping of Claims

The appealed claims stand or fall together.

Argument

The Office contends that the disclosure of the Tucker reference, either alone or in combination with the disclosure of the Richardson reference, renders obvious the substrate and adhesive tape of the present invention.

The Office indicates that Appellants' arguments and the Rule 132 declarations of Mr. Yoshio Nakagawa appear to be persuasive that the multi-step polymerized and mechanically blended propylene/ethylene copolymer used in the present invention is structurally (or morphologically) different from the copolymer disclosed by the Tucker reference, which was made by solution or suspension methods (see page 2 of Advisory Action dated December 8, 2003). However, the Office contends that Appellants' arguments and the Rule 132 declarations of Mr. Yoshio Nakagawa nevertheless are deficient for failing to recite the ratio of ethylene and propylene in the ethylene-propylene copolymers tested for purposes of the Rule 132 declarations, such that it is not apparent that the comparison study was carried out under comparable conditions (see page 2 of Advisory Action dated December 8, 2003). Appellants submit that the ethylene:propylene ratios need not be determined and recited because those ratios are of no consequence to the unobviousness of the present invention in view of the Tucker and Richardson references.

A. Disclosure of the Tucker Reference

The Tucker reference discloses an electrical tape comprising an adhesive and a halogen-free backing film comprising a resin containing an ethylene-propylene copolymer rubber (EP), ethylene-propylene-diene copolymer rubber (EPDM), ethylene vinyl acetate polymer, and ethylene diamine phosphate.

B. Comparison of Tucker With Present Invention

The present invention involves the use of Component A (which is a thermoplastic resin having a carboxyl oxygen atom in the molecular skeleton) and Component B (which is a propylene/ethylene copolymer obtained by multi-step polymerization involving two or more steps). The ethylene vinyl acetate polymer of the Tucker reference is the compound that is the most similar to Component A of the present invention, while the EP and EPDM rubbers of the Tucker reference are the compounds that are the most similar to Component B of the present invention.

C. Differences Between Tucker and Present Invention

The Tucker reference only describes solution or suspension polymerization as methods of preparing the EP and EPDM rubbers. Therefore, the Tucker reference does not actually disclose Component B of the substrate of the present invention, as recited in the appealed claims, which is required to have been obtained by multi-step polymerization involving two or more steps. Moreover, the Tucker reference does not disclose that the EP or EPDM rubber (or any other propylene/ethylene copolymer) has the dynamic storage modulus properties as required of Component B of the present invention as defined by the appealed claims.

Accordingly, there are differences between the present invention and the disclosure of the Tucker reference, and those differences include the different methods for preparing the EP and EPDM rubbers (of the Tucker reference) and the propylene/ethylene copolymer of Component B (of the present invention), as well as the failure of the Tucker reference to disclose the dynamic storage modulus properties as required of Component B (of the present invention). As evidence of the differences between the present invention and the disclosure of the Tucker reference, appellants submitted a Rule 132 declaration during prosecution of the subject patent application.

The Tucker reference, in the Examples, discloses a resin component comprising ethylene-vinyl acetate (Elvax 470) (similar to Component A of the present invention) and ethylene-propylene terpolymer (Epsyn 7506) (similar to Component B of the present invention). Since the Tucker reference does not actually teach or disclose Component B of the present invention, for the comparison study described in the Declaration under 37 C.F.R. § 1.132 of Yoshio Nakagawa dated September 26, 2002 (first Rule 132 Declaration), Epsyn 7506 (the most similar component to Component B of the present invention) was used. As described in the Rule 132 declaration, the dynamic storage modulus of the ethylene-propylene terpolymer (Epsyn 7506) did not satisfy the features recited in the appealed claims for Component B.

Specifically, the dynamic storage modulus of the ethylene-propylene terpolymer (Epsyn 7506) was 2 MPa at 23 °C, 1 MPa at 80 °C, and 0.7 MPa at 120 °C as compared a dynamic storage modulus at 23 °C of not less than 200 MPa and less than 400 MPa, a dynamic storage modulus at 80 °C of not less than 40 MPa and less than 180 MPa, and a dynamic storage modulus at 120 °C of not less than 12 MPa and less than 70 MPa, as recited in the pending claims.

Moreover, when Epsyn 7506 was used in the manner similar to Component B of the present invention to form a substrate for an adhesive tape, the thermal deformation of the resulting adhesive tape at 100° C was 100%, which is too high compared to the value of "not more than 65%" that is recited in the appealed claims for the adhesive tape comprising the inventive substrate. In other words, not only does the Tucker reference fail to disclose a propylene/ethylene copolymer of Component B of the present invention, but the most similar ethylene-propylene copolymer disclosed by the Tucker reference – when used in a manner similar to that recited in the appealed claims to make an adhesive tape – fails to provide a product as defined by the appealed claims. The fact that the Rule 132 declaration did not recite the ratio of ethylene and propylene in the tested ethylene-propylene copolymers is of no consequence. The Tucker reference clearly does not disclose Component B of the present invention, and the purpose of the Rule 132 declaration is to demonstrate that the specific compound disclosed in the Tucker reference that is the most similar to Component B, when used in the context of the present invention, does not inherently provide the present invention. The ratio of ethylene and propylene in the tested ethylene-propylene copolymers simply does not matter in demonstrating this point.

Thus, the Tucker reference does not disclose Component B as recited in the appealed claims, and the use of the most similar component actually disclosed in the Tucker reference (i.e., Epsyn 7506) does not result in either the substrate or the adhesive tape defined by the pending claims. There is no doubt, as appears to be acknowledged by the Office, that the Tucker reference does not disclose the present invention as defined by the appealed claims.

Furthermore, and importantly, there is nothing in the Tucker reference that suggests the modifications to that which is disclosed in the Tucker reference so as to arrive at the present invention as defined by the appealed claims. Under the circumstances, the disclosure of the Tucker reference alone cannot properly be considered to render obvious the substrate and adhesive tape of the present invention as defined by the appealed claims.

D. Richardson Does Not Remedy Tucker Deficiencies

The combination of the disclosure of the Tucker reference with the disclosure of the Richardson reference does not remedy the deficiencies of the Tucker reference.

The Richardson reference discloses a pressure sensitive adhesive comprising a tape substrate comprising (a) 40-85 wt.% olefin/vinyl or acrylic ester copolymer, (b) 0-20 wt.% low density polyethylene, (c) 20-55 wt.% inorganic filler and/or flame retardant, and (d) a silane coupling agent. The Richardson reference fails to disclose Component B (i.e., a propylene/ethylene copolymer) of the substrate of the present invention, as recited in the appealed claims. Indeed, the Richardson reference does not disclose a propylene/ethylene copolymer of any type, let alone a propylene/ethylene copolymer obtained by multi-step polymerization involving two or more steps in which the copolymer has a dynamic storage modulus as recited in the appealed claims. Moreover, nothing in the Richardson reference suggests modifying the polymer materials disclosed therein, or even the polymer materials disclosed in the Tucker reference, in order to obtain Component B, and then using it in combination with Component A, to form the substrate of the present invention.

As such, the disclosure of the Richardson reference in combination with the disclosure of the Tucker reference does not disclose all of the elements of the claimed invention and cannot properly be considered to render obvious the present invention as defined by the appealed claims.

E. Significance of Differences

The differences between present invention and the disclosures of the Tucker and Richardson references (considered individually or together) are significant. The significance of these differences further evidences the unobviousness of the present invention.

As mentioned above, and as discussed in the specification of the present application (see, e.g., specification at page 20, lines 14-19), the use of Component B as defined by the appealed claims (i.e., with the above-identified properties) results in an adhesive tape that is free from the generation of dioxin and toxic gas upon incineration. Additionally, the use of Component B with the specified properties ensures the adhesive tape has high levels of resistance to thermal deformation and flame resistance (see, e.g., specification at page 20, lines 14-19). Moreover, the use of Component B with the specified properties provides an adhesive tape with high levels of stretchability, which is beneficial in winding a tape (see, e.g., specification at page 20, lines 14-19). In particular, the specific dynamic storage modulus (E') of Component B (which is not taught or suggested by the Tucker reference) ensures the thermal deformation of the adhesive tape is sufficiently suppressed. Because Component B has a dynamic storage modulus (E') at 23°C of not less than 200 MPa and less than 400 MPa, the adhesive tape shows superior flexibility, thereby enhancing its followability to the object to which it is adhered.

The physical differences between an adhesive tape of the present invention (as defined by the appealed claims) and a comparative adhesive tape (not encompassed by the appealed claims) were further demonstrated by way of the Declaration under 37 C.F.R. § 1.132 of Yoshio Nakagawa dated February 28, 2003 (second Rule 132 Declaration). In particular, this second Rule 132 declaration demonstrated that the requirement in the appealed claims for the propylene/ethylene copolymer to be obtained by multi-step polymerization involving two or more steps (i.e., Component B of the present invention) leads to structural differences as compared to a propylene/ethylene copolymer obtained by other methods (e.g., mechanical blending). Specifically, transmission electron microscope (TEM) photographs of a film made of a mixture of Component A of the present invention and Component B of the present invention were compared to TEM photographs of a film made from a mixture of Component A of the present invention and *Comparative* Component B. For this experiment, Component A was an ethylene-vinyl acetate (EVA) copolymer (EVAFLEX P-1905). Component B was a propylene/ethylene copolymer obtained by multi-step polymerization involving two or more steps (CATALLOY KS-353P). CATALLOY KS-353P is a propylene/ethylene copolymer obtained by polymerization of a polypropylene (PP) component in the first step and polymerization of the ethylene-propylene rubber (EPR) component in the second step. *Comparative* Component B was a physical mixture (i.e., mechanical blend) of a PP component (NOVATECH FX3) and an EPR component (SPO VO-141). As depicted in the TEM photographs provided in this second Rule 132 declaration, the film containing Component B of the present invention clearly differed from the film containing *Comparative* Component B. To be specific, the films differed in the phase separation structure of each constituent component (PP/EPR/EVA). Component B of the present invention had a phase structure (integrated structure) wherein the PP component and the EPR component were continuously linked. In contrast, *Comparative* Component B had a phase structure wherein the PP component and the EPR component were each individually present (i.e., the PP component and EPR component were independently phase separated).

Thus, as described in this second Rule 132 Declaration, a propylene/ethylene copolymer obtained by multi-step polymerization involving two or more steps (i.e., Component B) is structurally different at a micro-level from a propylene/ethylene copolymer obtained by another method (e.g., mechanical blending). The adhesive tape of the present invention is believed by appellants to afford the beneficial effects described above due to this different microstructure.

None of the cited references recognizes that, by limiting the dynamic storage modulus of a propylene-ethylene copolymer that has been obtained by multi-step polymerization (i.e., by using Component B as recited in the appealed claims), an adhesive tape or substrate

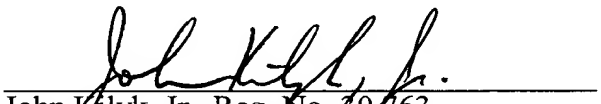
therefor can be realized that does not generate dioxin or toxic gas upon incineration, has high levels of resistance to thermal deformation and flame resistance, and has a high level of stretchability, as can be observed with the present invention.

In view of the foregoing, it becomes even more clear that the present invention, as defined by the appealed claims, is unobvious over the disclosures of the Tucker and Richardson references, whether considered individually or together.

Conclusion

For the foregoing reasons, Appellants respectfully request the reversal of the rejection of the subject patent application.

Respectfully submitted,



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APPENDIX – CURRENT CLAIM STATUS

1. (previously presented) An adhesive tape comprising a substrate and an adhesive layer formed on at least one side of the substrate, wherein the substrate comprises an olefin polymer and a flame retardant, but substantially no halogen atom, and the adhesive tape has a thermal deformation at 100°C of not more than 65%,

wherein the olefin polymer comprises the following Component A and Component B:

Component A: a thermoplastic resin having a carbonyl oxygen atom in the molecular skeleton;

Component B: a propylene/ethylene copolymer obtained by multi-step polymerization involving two or more steps;

wherein the Component B has a dynamic storage modulus (E') at 23°C of not less than 200 MPa and less than 400 MPa, a dynamic storage modulus (E') at 80°C of not less than 40 MPa and less than 180 MPa, and a dynamic storage modulus (E') at 120°C of not less than 12 MPa and less than 70 MPa.

2. (original) The adhesive tape of claim 1, which has an elongation at break of not less than 150% at a tension speed of 300 mm/min.

3.-5. (cancelled)

6. (original) The adhesive tape of claim 3, wherein the Component A is an ethylene copolymer or a metal salt thereof, having a melting point of not more than 120°C, which is obtained by polymerizing a vinyl ester compound, or an α, β-unsaturated carboxylic acid or a derivative thereof, or the vinyl ester compound and the α, β-unsaturated carboxylic acid or a derivative thereof.

7. (original) The adhesive tape of claim 3, wherein the Component A and the Component B are mixed at a weight ratio (A:B) of 1:9 - 8:2.

8. (previously presented) The adhesive tape of claim 1, wherein the flame retardant is added in an amount of 20 - 200 parts by weight per 100 parts by weight of the olefin polymer.

9. (previously presented) The adhesive tape of claim 1, wherein the flame retardant is a metal hydroxide.

10. (previously presented) The adhesive tape of claim 1, which has a dynamic storage modulus (E') at 80°C of not less than 25 MPa and a dynamic storage modulus (E') at 120°C of not less than 10 MPa.

11. (previously presented) The adhesive tape of claim 1, wherein the substrate is not crosslinked during or after a forming process thereof.

12. (previously presented) A substrate for an adhesive tape, which comprises an olefin polymer and a flame retardant, but substantially no halogen atom, wherein the olefin polymer comprises the following Component A and Component B:

Component A: a thermoplastic resin having a carbonyl oxygen atom in the molecular skeleton;

Component B: a propylene/ethylene copolymer obtained by multi-step polymerization involving two or more steps;

wherein the Component B has a dynamic storage modulus (E') at 23°C of not less than 200 MPa and less than 400 MPa, a dynamic storage modulus (E') at 80°C of not less than 40 MPa and less than 180 MPa, and a dynamic storage modulus (E') at 120°C of not less than 12 MPa and less than 70 MPa.

13.-14. (cancelled)

15. (original) The substrate of claim 12, wherein the Component A is an ethylene copolymer or a metal salt thereof, having a melting point of not more than 120°C, which is obtained by polymerizing a vinyl ester compound, or an α, β-unsaturated carboxylic acid or a derivative thereof, or the vinyl ester compound and the α, β-unsaturated carboxylic acid or a derivative thereof.

16. (original) The substrate of claim 12, wherein the Component A and the Component B are mixed at a weight ratio (A:B) of 1:9 - 8:2.

17. (original) The substrate of claim 12, wherein the flame retardant is added in an amount of 20 - 200 parts by weight per 100 parts by weight of the olefin polymer.

18. (original) The substrate of claim 12, wherein the flame retardant is a metal hydroxide.

19. (original) The substrate of claim 12, which has a dynamic storage modulus (E') at 80°C of not less than 25 MPa and a dynamic storage modulus (E') at 120°C of not less than 10 MPa.

20. (original) The substrate of claim 12, which is not crosslinked during or after a forming process thereof.